

WHAT IS CLAIMED IS:

1. A fluid exchange process for withdrawing a used fluid from a system and supplying a new fluid into the system, comprising:

withdrawing the used fluid from the system into a first chamber;

supplying the new fluid into the system in response to the used fluid in the first chamber; and

removing the used fluid from the first chamber.

2. The fluid exchange process of claim 1 wherein the step of withdrawing the used fluid further comprises setting a switch to a first state in response to the used fluid in the first chamber, and wherein the step of supplying the new fluid further comprises supplying the new fluid into the system in response to the first state of the switch.

3. The fluid exchange process of claim 1 further comprising a step of providing the new fluid from a second chamber wherein the step of supplying the new fluid further comprises withdrawing the new fluid from the second chamber and supplying the new fluid into the system in response to the used fluid in the first chamber.

4. The fluid exchange process of claim 1 wherein the volume of the used fluid withdrawn from the system is substantially equal to the volume of the new fluid supplied to the system.

5. The fluid exchange process of claim 1 wherein the fluid comprises automatic transmission fluid, and wherein the system comprises a vehicular automatic transmission system.

6. The fluid exchange process of claim 1 wherein the used fluid is withdrawn from the system at a first rate and the new fluid is supplied to the system at a second rate.

7. The fluid exchange process of claim 6 wherein the first rate is substantially equal to the second rate.

8. The fluid exchange process of claim 1 further comprising terminating the supply of new fluid into the system in response to an empty condition of the first chamber.

9. The fluid exchange process of claim 1 further comprising a step of transferring heat from the used fluid to the new fluid.

10. The fluid exchange process of claim 9 wherein the step of transferring heat comprises causing the used fluid to flow through a heat exchanger surrounded by the new fluid for transferring heat from the used fluid to the new fluid.

11. The fluid exchange process of claim 9 wherein the step of transferring heat lowers a viscosity of the new fluid.

12. The fluid exchange process of claim 11 wherein the step of transferring heat tends to equalize a viscosity the new fluid and the viscosity of the used fluid.

13. The fluid exchange process of claim 1 further comprising in response to the presence of used fluid in the first chamber, activating a first pumping mechanism for removing the used fluid from the first chamber.

14. The fluid exchange process of claim 13 wherein the step of activating further comprises supplying power to the first pumping mechanism in response to a position of a float switch disposed in the first chamber, and wherein the position is responsive to a used fluid level in the first chamber.

15. The fluid exchange process of claim 1 wherein the step of removing further comprises transferring the used fluid into a used fluid tank.

16. The fluid exchange process of claim 1 wherein the step of supplying the new fluid further comprises activating a second pumping mechanism for supplying the new fluid into the system.

17. The fluid exchange process of claim 1 wherein the step of supplying the new fluid further comprises transferring the new fluid from a new fluid tank into a second chamber, and wherein in response to the new fluid in the second chamber and the used fluid in the first chamber, the new fluid is supplied to the system.

18. The fluid exchange process of claim 1 wherein the system comprises a closed loop system, the process further comprising opening the closed loop system to form an outlet port and an inlet port, and wherein the step of withdrawing the used fluid comprises withdrawing the used fluid from the outlet port, and wherein the step of supplying the new fluid comprises supplying the new fluid into the inlet port.

19. The fluid exchange process of claim 18 further comprising:
connecting a first valve to one of the inlet port and the outlet port;
connecting a second valve to the other of the inlet port and the outlet port;

establishing a flow path through the first valve and the second valve for withdrawing the used fluid from the outlet port and for supplying the new fluid to the inlet port.

20. A fluid exchange process for withdrawing a used fluid from a system and supplying a new fluid into the system, comprising:

causing the used fluid to flow into a first chamber;

in response to the used fluid in the first chamber, pumping the used fluid from the first chamber into a waste chamber; and

in response to the used fluid in the first chamber, pumping the new fluid into the system.

21. The fluid exchange process of claim 20 wherein the system is pressurized, and wherein the step of causing the used fluid to flow into the first chamber further comprises forming a used fluid flow path from the system to the first chamber.

22. The fluid exchange process of claim 20 wherein the step of pumping the new fluid further comprises:

pumping the new fluid into a second chamber; and

in response to the new fluid in the second chamber, pumping the new fluid from the second chamber into the vehicle.

23. A process for infusing a new fluid into a system while a used fluid is evacuating from the system, comprising:

storing the new fluid for infusing into the system in a tank;

causing the used fluid evacuating from the system to flow through a tube disposed in the tank such that heat from the used fluid is transferred to the new fluid; and

supplying the new fluid into the system.

24. A fluid exchange process for withdrawing a used fluid from a system and supplying a new fluid into the system, comprising:

withdrawing the used fluid from the system into a first chamber; and

in response to the used fluid in the first chamber, infusing the new fluid into the system by operation of an electrically powered pumping mechanism.

25. A machine for exchanging a used fluid in a system with a new fluid, comprising:

a first fluid flow path for receiving the used fluid from the system;

a second fluid flow path for infusing the new fluid into the system; and

a first pump responsive to the volume of the used fluid received from the system for supplying a substantially equivalent volume of the new fluid into the system through the second fluid flow path.

26. The machine of claim 25 wherein the system comprises a vehicular transmission system, and wherein the new fluid and the used fluid comprise new transmission system fluid and used transmission system fluid, respectively.

27. The machine of claim 25 further comprising:

a waste fluid tank;

a chamber for receiving the used fluid; and

a second pump for withdrawing the used fluid from the chamber and for supplying the used fluid into the waste fluid tank, wherein the first pump is responsive to the volume of the used fluid in the chamber for supplying a substantially equivalent volume of the new fluid into the system through the second fluid flow path.

28. The machine of claim 27 wherein the chamber comprises a float switch responsive to the volume of the used fluid in the chamber for energizing the first pump in response thereto.

29. The machine of claim 25 further comprising:

a new fluid tank containing the new fluid;

a chamber; and

a second pump responsive to the new fluid in the new fluid tank for supplying the new fluid into the chamber, and wherein the first pump is responsive to the new fluid in the chamber for supplying the new fluid into the system through the second fluid flow path.

30. The machine of claim 29 wherein the chamber comprises a float switch responsive to the volume of the new fluid in the chamber for energizing the second pump in response thereto.

31. The machine of claim 25 wherein the first fluid flow path and the second fluid flow path are joined to form a closed fluid flow path, and wherein a valve having selectable first and second fluid flow paths therethrough is disposed within the path, and wherein when the valve is disposed in the first position the used fluid is withdrawn from the path into the chamber, and wherein in response to the volume of the used fluid in the chamber the first pump supplies a substantially equivalent volume of the new fluid into the system through the second fluid flow path.

32. The machine of claim 31 further comprising:
a waste fluid tank; and
a second pump for withdrawing the used from the chamber into the waste fluid tank in response to a volume of the used fluid in the chamber.

33. The machine of claim 31 wherein the valve comprises a solenoid valve.

34. The machine of claim 25 further comprising:
a chamber;
a new fluid tank for holding the new fluid; and
a second pump responsive to the new fluid in the new fluid tank, wherein the second pump withdraws the new fluid from the new fluid tank into the chamber, and wherein the first pump withdraws the new fluid from the chamber for supplying the new fluid into the system through the second fluid flow path.

35. The machine of claim 34 further comprising a float switch disposed in the new fluid tank, wherein when a level of the new fluid in the new fluid tank reaches the float switch the float switch de-energizes the second pump.

37. The machine of claim 34 wherein the first and the second fluid flow paths are joined to form a continuous fluid flow path, wherein a segment of the continuous fluid flow path is disposed in the new fluid tank such the heat retained by the used fluid flowing through the continuous fluid flow path is transferred to the new fluid in the new fluid tank.

38. The machine of claim 25 wherein the first fluid flow path and the second fluid flow path are joined to form a continuous fluid flow path, the machine further comprising a valve/spigot having an opened and a closed position and disposed in the continuous fluid path, and wherein fluid is discharged from the closed fluid path by selectively placing the valve/spigot in the opened position.

39. The machine of claim 25 wherein one of the first and the second fluid flow paths comprises a pressure gauge for determining a pressure of the fluid flowing therethrough.

40. The machine of claim 25 wherein the system comprises a vehicle transmission system, and wherein the used fluid comprises used transmission fluid and the new fluid comprises new transmission fluid.

41. The machine of claim 25 further comprising:

a first valve having first, second and third ports, wherein the first valve further comprises first and second selectable positions, wherein in the first position the first port is in fluid communication with the second port and in the second position the first port is in fluid communication with the third port;

a second valve having fourth, fifth and sixth ports, wherein the second valve further comprises first and second selectable positions, wherein in the first position the fourth port is in fluid communication with the fifth port and in the second position the fourth port is in fluid communication with the sixth port;

wherein the third and the fifth ports are connected in fluid communication at a junction and wherein the junction further comprises a junction port in fluid communications with the third and the fifth ports;

wherein when the first and the second valves are disposed in the first position, the first fluid flow path for receiving the used fluid from the system comprises the fourth and the fifth ports of the second valve and the junction port, and wherein the second fluid flow path for infusing the new fluid into the system comprises the second and the first ports of the first valve; and

wherein when the first and the second valves are disposed in the second position, the first fluid flow path for receiving the used fluid from the system comprises the first and the third ports of the first valve and the junction port, and wherein the second fluid flow path for infusing the new fluid into the system comprises the sixth and the fourth ports of the second valve.

42. A machine for exchanging a used fluid in a system with a new fluid, comprising:

a first fluid flow path for receiving the used fluid from the system;

a second fluid flow path for infusing the new fluid into the system;

a waste fluid tank;

a first chamber for receiving the used fluid from the first fluid flow path; and

first and second pumps operative in response to the used fluid in the first chamber, the first pump for withdrawing the used fluid from the first chamber and for supplying the used fluid into the waste fluid tank, the second pump for infusing the new fluid into the system through the second fluid flow path.

43. The machine of claim 42 wherein the first and the second pumps pump substantially the same volume of their respective fluids.

44. The machine of claim 42 further comprising:

a third pump;

a second chamber; and

a new fluid tank for holding the new fluid, the third pump for pumping the new fluid from the new fluid tank into the second chamber, wherein the second pump withdraws the new fluid from the second chamber for infusing the new fluid into the system through the second fluid flow path.

45. The machine of claim 44 wherein the second pump is operative in response to the new fluid in the second chamber.

46. The machine of claim 45 wherein the second chamber comprises a float switch having a first and a second position, and wherein the position of the float switch is responsive to a level of the new fluid in the second chamber such that the float switch is in the second position when the level is above a predetermined value, and wherein the second pump is operative in response to the second position of the float switch.

47. The machine of claim 45 the second pump infuses substantially all of the new fluid from the second chamber into the system through the second fluid flow path, such that the volume of the new fluid infused into the system is substantially equal to a volume of the used fluid received from the system.

48. In a machine for exchanging a used fluid in a system with a new fluid, an apparatus for withdrawing heat from the used fluid and supplying heat to the new fluid, comprising:

a tank holding the new fluid;

a coil having a fluid passageway therethrough disposed within the tank and substantially surrounded by new fluid;

a component for passing used fluid through the coil, during which heat flows from the used fluid to the new fluid held in the tank.

49. The apparatus of claim 48 wherein the component comprises a pump.